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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/790,828	03/03/2004	Masakiyo Matsumura	249687US2	1522

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EXAMINER	
SONG, MATTHEW J	
ART UNIT	**PAPER NUMBER**
1722	

SHORTENED STATUTORY PERIOD OF RESPONSE	NOTIFICATION DATE	DELIVERY MODE
3 MONTHS	04/10/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

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Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/790,828	MATSUMURA ET AL.	
	Examiner	Art Unit	
	Matthew J. Song	1722	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 January 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-39* is/are pending in the application.

4a) Of the above claim(s) *20-38* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19 and 39* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Withdrawn Rejections

1. Applicant's arguments, see page 15 of the remarks filed 1/12/2007, with respect to the 35 U.S.C. 112 second paragraph rejection have been fully considered and are persuasive. The rejection of claims 1-19 has been withdrawn.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-14, 19 and 39 are rejected under 35 U.S.C. 102(b) as anticipated by Taniguchi (US 5,710,620).

Taniguchi discloses an apparatus comprising a phase shifted reticle where the angle of diffracted light generated from a pattern of the reticle varies with the line width and pitch of the pattern (col 10, ln 15-40 and col 12, ln 45-60), this reads on applicant's phase modulation element in which a phase of outgoing light beams relative to incident light beams differs depending on each position. Taniguchi also teaches an illumination system **1** used to generate light beams which enter the phase modulation element (col 5, ln 1-15 and col 10, ln 15-30). Taniguchi also teaches an image formation optical system **7A, 8** provided on an outgoing

radiation side of the phase modulation element **R** (col 5, ln 1-67 and Fig 1). Taniguchi also discloses a stage **WS** for holding a wafer **W** (col 6, ln 45-65 and Fig 1).

Regarding the limitation "the phase modulation element has a phase distribution based on a phase modulation unit which is optically smaller than a radius of a point spread distribution range of the image formation optical system when converted to an image formation surface to the image formation optical system", the limitation is indefinite for the reasons discussed previously. For the purposes of expediting examination, the limitation is interpreted to be an intended use limitation based on the desired radius of a point spread distribution from the optical system. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. Taniguchi discloses all of the apparatus limitation, as discussed previously, and the apparatus is capable of changing the illumination conditions, ring zone illumination and grading illumination by the arrangement of the parts, thus would be capable of the producing a point spread distribution radius which is optically large than the phase modulation element. The same argument applies to claims 3-6, 8-9, 12-14 and 19 directed to features of the phase modulation element compared to the radius of a point spread distribution.

Referring to claim 2, Taniguchi teaches an area that shares a first phase value and a second phase value (Fig 2D and 2F).

Referring to claim 3, Taniguchi teaches a plurality of cells (Fig 3A and Fig 6).

Referring to claim 4, Taniguchi teaches pixel **13A.**

Referring to claim 5, Taniguchi discloses a strip-like pattern (Fig 6 and 12A).

Referring to claims 6 and 10-14, Taniguchi discloses a plurality of normal patterns with different preciseness (line width and pitch) (col 12, ln 40-65), this reads on applicant's ratio of the line and space portion varies.

Referring to claims 7 and 9, Taniguchi discloses a cyclically divided area structures comprising a line space structure (Fig 11A).

Referring to claim 8, Taniguchi teaches a mixed reticle with cyclic properties (col 15, ln 10-25) and a pixel in Fig 13A.

Referring to claim 19, claim 19 contains all of the features of claim 1, as discussed previously, except the preamble is directed to a exposure apparatus. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951). Taniguchi teaches an exposure apparatus (Abstract).

Referring to claim 39, claim 39 has all of the same limitations as claim 1, which was discussed previously. Claim 39 further requires "in at least one direction" which is met because the apparatus is capable of producing a radius of a point spread distraction range of the image formation optical system that is larger than the phase modulation element is at least one direction.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taniguchi (US 5,710,620) as applied to claims 1-14 and 19 above, and further in view of Applicant's admitted prior art (AAPA)

Taniguchi discloses all of the limitations of claim 15, as discussed previously, except the phase modulation element turns the incident light beam to a light intensity distribution with a concave pattern that a light intensity in increased toward the periphery from a central area having a first intensity.

In a method of manufacturing a semiconductor, AAPA teaches a phase shifter and light absorption distribution are combined to irradiate a film with light beams having a intensity including a concave pattern and an inverse pattern (pg 3, line 1 to pg 4, ln 25 of the

specification). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Taniguchi by using the phase shifter taught by AAPA to produce a desirable light intensity pattern for the manufacture of semiconductors.

Referring to claim 16-18, the combination of Taniguchi and AAPA teaches concave and an inverse peak pattern.

Response to Arguments

6. Applicant's arguments with respect to claim 39 have been considered but are moot in view of the new ground(s) of rejection.

7. Applicant's arguments filed 1/12/2007 have been fully considered but they are not persuasive.

Applicant's argument that Taniguchi fails to teach any size relationship between the patterns on the mask and a radius of a point spread distribution range of the projection optical system is noted but is not found persuasive. The radius of the point spread distribution range of the image formation optical system is merely the output of the system. Applicant merely intended that the system produce a radius of the point spread distribution range is optically larger than the phase modulation units. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. Although Taniguchi does not teach this claimed relationship between the modulation unit and radius of the point spread

distribution. The apparatus taught by Taniguchi is capable of producing a radius of point spread distribution that is larger than the phase modulation unit because the numerical aperture of the optical system can be varied as required, note column 6, lines 25-45, and the radius of point spread distribution is directly related to the size of the numerical aperture, note applicant's instant claim 1.

Applicant's argument that Taniguchi fails to teach a phase modulation element configured to transmit a light having a phase distribution based on a phase pattern of the at least two phase modulation units to vary a light intensity distribution at the single crystal is noted but is not found persuasive. This limitation is merely an intended use of the apparatus. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. Taniguchi teaches the phase shifted reticle affects the light intensity distribution, note column 10, lines 10-30; therefore the apparatus taught by Taniguchi is capable of the claimed intended use, thus meets the claimed limitation.

In summary, applicant's arguments are directed to the intended use of the apparatus, i.e. producing a radius of the point spread distribution range of the image formation optical system is larger than the phase modulation unit. However, applicant's claim is directed to an apparatus. Taniguchi discloses all of the claimed structural limitations (a phase modulation element, illumination system, image formation optical system and a stage) of applicants apparatus and is capable of applicant's intended use, thus meets the claimed limitation.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Shiraishi (US 5,715,089) teaches a pattern of stripe and pixels (Fig 7A and 7C).

Kunii et al (US 6,388,386) teaches modulating a intensity of light beam using a cyclic light and dark pattern using a line, wavy lines and grid pattern (Abstract and Fig2A-2D).

Lin et al (US 5,539,568) teaches the size of the beam of light modulated by each pixel or element of the phase modulator should be no larger than the minimum feature of the mask (col 7, ln 40-65).

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J. Song whose telephone number is 571-272-1468. The examiner can normally be reached on M-F 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Yogendra Gupta can be reached on 571-272-1316. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Matthew J Song
Examiner
Art Unit 1722

MJS
April 2, 2007

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SUPERVISORY PATENT EXAMINER
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